Divergent Appeals for Water Conservation in the Ogallala Aquifer Basin

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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The Ogallala aquifer underlies 111.4 million acres across eight U.S states (McGuire, 2007). About 27 percent of U.S. farmland depends on the aquifer for irrigation (USDA, 2011), and it provides drinking water for 2 million Americans. (Dennehy, 2000). During the agricultural revolution of the 1950s, farmers drew much more water from the aquifer. Since then, irrigation has lowered the water table by up to 277 feet in some areas (McGuire, 2007). Large agricultural enterprises, independent farmers, conservation nonprofits, and others agree that the depletion of the Ogallala aquifer must be slowed or stopped. These groups disagree intensely about whether and how best to conserve the aquifer. They do so by invoking competing ideas about economic incentives, ecological value, the balance between property rights and the legitimate exercise of state authority, and the present generation's obligations to future generations.

Review of Research

Researchers who have evaluated water conservation policies have generally done so in economic terms. Amosson et al. (2009) concluded that better irrigation techniques without long-term water use restrictions are ineffective and can increase water consumption. Ward and Pulido-Velazquez (2008) concur and recommend better water usage accounting. Yang et al. (2003) concluded that usage accounting alone is ineffective. They contend that conservation requires specific and legally enforceable water rights and responsibilities. These studies do not consider the social factors that influence the implementation of water conservation policies.

Studies that do focus on property rights and conservation include Moon et al. (2012), who found that landowner's desire to follow biodiversity conservation programs depended on social and personal circumstances like stress, hours spent working the land, and their trust of the government. Zhao et al. (2012) likewise found that citizens who owned large tracts of land more

often joined forest conservation programs, and that their age was not a factor. Boudreaux & Nelson (2011) found that through empowering Namibia's poor with property rights, they disincentivized destructive practices like poaching due to more people having a stake in the success of the land. Namibians were able to use tourism as a path sustainable development because it "creates both income for local people and a connection between the welfare of local people and the preservation of a natural resource."

Studies that have observed the effectiveness of a state's authority in implementing conservation policies include Lepp & Holland (2006), who compared the attitudes of villagers who experienced two kinds of conservation, "one led by the state with minimal local involvement, and another led by community members with abundant local participation." They found that the community-based approach generated a more positive attitude towards conservation, and lead to greater involvement from the villagers in the program. Simmons et al. (2018), found that with regards to forest conservation, uncertainty about government policy led to an increase in deforestation and reduced landholder's motivation to protect the environment. Apostolopoulou & Pantis (2009), found that government lead conservation initiatives can be severely hampered by myriad factors such as a lack of clear goals, non-independent appraisal for the plan, ineffective promotion, and a "distortion of decision processes in favor of satisfying economic and development interests."

Studies that home in on social factors in conservation include Dickman (2010), who claims that social factors strongly influence the perception and resolution of human-wildlife conflicts. Mascia et al. (2003) likewise posits that the gap between "our biological knowledge and conservation success" can be explained by social factors. They furthermore claim that because "conservation interventions are the product of human decision-making processes and

require changes in human behavior to succeed." Lauer et al. (2012) reviewed literature on the depletion of the Ogallala Aquifer. They noted that the depletion continues despite its "widespread recognition among producers, managers, policymakers, and the public; myriad conservation strategies; and several decades of research" (p. 593). Lauer et al. claims there is "relatively little research into nonmarket and cultural value" (p. 596) provided by the aquifer. They argue that "successful policy design and implementation require a thorough understanding of stakeholder values and motivation" (p. 598). Applied to participants in the Ogallala Aquifer, the current research can illuminate how they appeal to the farmer's value to support effective conservation policies.

Economic Values

"The regional economy of the High Plains depends almost exclusively on agriculture irrigated by Ogallala groundwater" (Scott, 2019). Seizing on this fact, many promoters of water conservation in the region use economic incentives to entice farmers and municipalities to commit to sustainable water use.

The Kerr Center for Sustainable Agriculture is an advocacy group that's active in Oklahoma, within the aquifer's basin. In 2019, a blog post from the Kerr Center website about a recent study that had shown success in using legumes to lower water use in livestock production emphasized the economic benefit of the technique, explaining how "in addition to conserving water, such a transition builds soil organic matter, stabilizes soil from wind erosion, and diversifies income," and additionally how "results showed that steers gained more weight, and gained it more quickly" (Kerr Center, 2019).

The Ogallala Water Coordinated Agriculture Project (OWCAP) is an organization made up of seventy researchers from nine universities across six states within the aquifer's region. It's dedicated to addressing issues related to groundwater decline and long-term agricultural sustainability. In a 2020 newsletter, OWCAP discussed results from a study done comparing the economics of switching to Mobile Drip Irrigation (MDI) from conventional Low Elevation Spray Application (LESA) systems. They shared how "total variable costs (including fuel, lubrication, maintenance, and repairs) were lower for MDI when compared to LESA systems" (Ogallala Water, 2020). Additionally, OWCAP stressed how farmers could potentially enroll in "Cost-share assistance for conversion to MDI through NRCS EQIP or other programs."

Economic incentives to conserve water are used to appeal to homeowners in the Ogallala Aquifer Basin as well. The High Plains Water District (HPWD) is a groundwater conservation district created in Texas and services sixteen counties within the state. On their website, the HPWD has a section dedicated to "waterwise landscaping", a guide made for homeowners with recommendations on how to water-conscientiously maintain their lawn. They highlight that "outdoor watering can account for 50 to 80 percent of home water use in the spring and summer," and "By transitioning to a waterwise landscape, you can cut down on your daily water use and lower your monthly water bill while creating an outdoor oasis" (HPWD, 2021).

An appeal to economic values when supporting a water conserving agenda is effective because it quashes the stigma that sustainable practices mean more expensive practices.

Ecological and Intrinsic Value

A slew of ecosystems including wetlands, estuaries, and rivers rely on the Ogallala Aquifer to control the salinity of the water table and provide nutrients (MIT, 2012). As such, promoters of water conservation draw connections between the health of the surrounding ecosystems and the quality of the drinking water to demonstrate the necessity of water conservation policies.

The Earth Day Network (EDN) is a non-profit based out of Washington D.C and grew out of the first Earth Day in 1970. Their mission is to "diversify, educate and activate the environmental movement worldwide" (EDN, 2021). In a 2015 publication about president Barack Obama's decision to veto the Keystone XL Pipeline, a writer for the EDN had this to say about the Pipeline:

> However, the proposed Keystone XL Pipeline runs through Nebraska's Ogallala Aquifer, an important source of water for citizens and for the agriculture industry. Thus, an oil spill would destroy ecosystems and pollute the water supply. While new technologies constantly being developed to minimize the frequency and the severity of spills, they are inevitable; the possibility of destroying these pristine environments—and the enormous costs of cleaning up the sticky, dirty tar—is simply not worth the risk (Gooljar, 2015).

The Playas Lakes Joint Venture (PLJV) is "a regional partnership of federal and state wildlife agencies, conservation groups and private industry dedicated to conserving bird habitat throughout the western Great Plains" (PLJV, 2019). On the PLJV's website is an informative webpage about playas. They describe playas as "seasonal wetlands," that "provide much-needed water for wildlife and people," playas support "185 bird species, 450 plant species, 13 amphibian

species, and 37 mammal species," and are also the "primary source of recharge for the Ogallala Aquifer" (PLJV, 2021). The PLJV also emphasizes how playas "filter and clean water going down into the aquifer" and that unless steps are taken to protect playas with native grass buffers, that the "sediment transported from cultivated fields by runoff" will lead to "decline in critical playa ecosystem functions" (PLJV, 2021).

Conservationists appealing to environmentalism to push water conserving policies also highlight the drastic change to the familiar natural landscapes that the depletion of the Ogallala can potentially bring on. Take for example, a 2017 news story from Colorado State University which addressed the potential for streams and rivers to dry up. In the words of Professor Kurt Fausch:

> "If they lose the river, they'll not only lose fishes, but they'll also lose water for their cattle, and cottonwoods that provide shade," Fausch explained. "They also lose the grass that grows in the riparian zone, which is critical forage for cattle in summer. Some of that's your livelihood, but it's also the place you go for picnics, and to hunt deer and turkeys. If you lose the river, you lose a major feature of what that landscape is" (Guiden, 2017).

The point Fausch and the author are trying to convey is that even though aquifer depletion itself is out of sight, hidden beneath the ground, its effects have the potential to bring on dramatic change the whole landscape of the Ogallala Basin.

Appeals to ecological values, and the value intrinsic to nature are effective because they frame the decision to implement water conservation policies as choice between a minor but in the end positive disruption to the status quo, or alternatively, a catastrophic disruption to the status quo if no action is taken.

Property Rights and State Authority

Groundwater access lies at the intersection of property rights and a state's responsibility to regulate public resources. The waters of the Ogallala aquifer are within the borders of private citizen's property, and classified as a public resource in most states. Water conservationists argue that because of groundwater's status as a public resource, that its use should be restricted by state law. Opposing them are a cohort of citizens who believe that like oil and natural gas, groundwater on their private property is entirely theirs and thus cannot and should not be subject to pumping restrictions.

In 2012, the Texas Supreme Court confirmed that landowners are entitled to all the groundwater on their property at any time, just like oil and natural gas. The case resulted from a lawsuit carried out by the Texas Farm Bureau (TFB) against the Texas Commission of Environmental Quality (TCEQ) on the behalf of farmers along the Brazos river. With 500,000 members the TFB is Texas' largest farming organization, they have grassroots support and describe themselves as "resilient, politically active and policy driven" (TFB, 2021), according to their mission statement page:

> We believe private property rights are worth protecting, water should be used wisely and government should be responsive and responsible. That's why we advocate with our members in Austin and Washington. (TFB, 2021)

In a 2016 publication about their victory in Texas Supreme Court case, an editor for the TFB explained how "first in time, first in right—is the simple idea that has guided appropriations of Texas surface water," and "the Texas agency [TCEQ] strayed from state water law" (Tomascik, 2016). First in time, first in right, is the idea that the first people to use a water source gets priority access to that water source, in times of water scarcity those with junior (lower) priority

are the first to lose the water pumping privileges for the sake of those with senior (higher) priority. The farmers in the lawsuit had priority access to water over the municipalities but since the TCEQ only put water restrictions on farmers and not the municipalities, they had violated the Texan water law by bypassing the priority system.

Not all supporters of property rights want unassailable access to groundwater. From Haskell County Kansas, comes an interesting example of property rights being used as tool of water conservation. Jay Garetson, a fifth-generation farmer, watched as his wells began to run dry. He realized it was the fault of the wells owned by American Warrior, a nearby oil and gas company. However, the chief engineer for Kansas who normally handle these disputes was not doing anything to help the situation, so Jay took the problem into his own hands. Utilizing first in time, first in right water law, Jay leveraged his senior priority water access and took American Warrior to court. Jay describes his motivation for the lawsuit "It was a combination of wanting to secure the opportunity for our farm's future generation, as well as the opportunity to secure water for all generations," he also stated "Our goal has been to bring attention to the urgent state of decline of the Ogallala Aquifer in GMD No. 3" (Bickel & Agland 2017). The courts ruled in Jay's favor, and he was able to get the offending wells shut down, successfully using property right law as a surrogate for the absent state authority.

Seven of the eight states on the Ogallala Basin own and can regulate groundwater, with Texas being the exception. The states that have authority over their groundwater face challenges to conservation efforts from private citizens, but they also face challenges from neighboring states, because in addition to the aquifer the states also hold some of the same rivers in common. Consider the case of the Republican River, which receives water from the Ogallala Aquifer. The river is held in common between the states of Colorado, Kansas, and Nebraska, who have all

agreed to a compact specifying how much water they can withdraw from the river basin. Kansas has, on multiple occasions, taken cases to the supreme court against Nebraska over them using more than water than the compact allotted for. In 2015 after a successful lawsuit against Nebraska, Kansas Attorney General Derek Schmidt remarked "For the first time in the history of interstate water law, the U.S. Supreme Court has ordered an upstream state to give up some of its unjust gains from keeping water that did not belong to it" (Knapp, 2015). In response to the lawsuit, Nebraska adopted water conservation policies such as restoring rangelands, shutting down wells, and pumping water from regions of the aquifer that had a surplus into the Republican River so Kansas could rely on river water more to compensate for their depleted aquifers. By wielding their authority as a state, Kansas was able to other press its neighbors to adopt water conservation policies.

Probably the most powerful, but also the most contentious way to push water conservation policies is to toe the line between property rights and state authority over ground water resources.

Family Values

Most American farmers are second-generation farmers and above (Zulauf, 2004). With this in mind, promoters of water conservation practices often appeal to farmer's ingrained family values to garner their support.

In 2021, farmers in Wichita county Kansas established a Local Enhanced Management Area (LEMA). A LEMA is an agreement made by farmers in a region to draw less water from the aquifer. The agreement is then enforced by engineers working for the state government. During the initial hearing for the creation of the LEMA, one proponent appealed, "What will our

children and grandchildren remember that we passed on to them. We must reduce and sustain this critical natural resource for future generations" (KDA, 2020).

Sustainable Agriculture Research and Education (SARE) is a grants and outreach program from the U.S Department of Agriculture (USDA). In one of SARE's publications on Water Conservation in the Ogallala region, SARE praises an alternative production system to monoculture cotton that it funded the research of. SARE explained that the system would help to "keep the High Plains region thriving for generations to come" (SARE, 2015).

Consider the cancelled Keystone XL oil pipeline, whose intended route would have taken it right through the Ogallala Aquifer. It drew the attention of many groups who fought its implementation. One such group was Farm Aid, a music festival whose mission statement is to "promote a strong and resilient family farm system of agriculture" (Farm, Aid 2021). Farm Aid does not present itself as a conservationist group, but with the Keystone Pipeline planned to go through many family-owned farms, their interests aligned with those of conservationists. In a 2015 publication by Farm Aid about the pipeline, they lament the damage caused by spills from the original pipeline, "years later, families throughout the Midwest and Plains are *still* recovering from tar sands spills in their communities" (Farm, Aid 2015).

The effectiveness of an appeal to family values when selling a conservationist agenda to farmers cannot be understated.

Conclusion

The motives of groups campaigning for water conservation in the Ogallala Aquifer Basin are not a monolith, and neither are the appeals through which they sway others to their cause. Instead, they cover a spectrum of ideas ranging from economics to ecology, emphasize the plight

of the American family, navigate the tenuous balance between private property and state authority.

Cultivating a holistic understanding of the stakeholders in the Ogallala Aquifer Basin and their values is a crucial step towards crafting and implementing effective water conservation policies. Policies that can garner enthusiastic support at the local level, assuage concerns about economic sacrifices and personal liberties, and ensure a pristine natural environment. Looking through this lens, we can turn a critical eye toward past attempts at water conservation and understand why some initiatives succeeded, while others failed. This holistic approach to systems can be applied to myriad other natural resources like fisheries and lumber, the approach can also work in contexts outside of nature. Movements to revitalize previously neglected inner city neighborhoods, which can have several motivations ranging from economic opportunity to cultural healing. The digital space can also make use of this approach, websites are a nexus of political, social and economic interests.

I personally recommend extending this research to other large aquifers, such as the Central Valley Aquifer in California, or the Arabian Aquifer System that spans the near east. The difference in family values, the political status of water, and attitudes towards nature in either location will likely contrast with that of Middle-America and make for interesting points of comparison.

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